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Introduction

The Southeast Gillnet Observer Program has adapted to the changes of the Florida-Georgia shark gillnet fishery since the program began in 1993 (e.g. Carlson and Bethea 2007 and references therein, Passerotti et al. 2011). There are currently about 500 total directed and incidental shark permits issued in the US Atlantic and Gulf of Mexico, while the number of gillnet fishers changes from year to year. Gillnet effort targeting large coastal (LCS) and small coastal (SCS) sharks has declined in recent years as a result of Amendments 2 and 3 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan (NMFS 2007, 2010). Fishers have consequently increased effort targeting finfish, including Spanish mackerel *Scomberomorus maculatus*, king mackerel *Scomberomorus cavalla*, and bluefish *Pomatomus saltatrix*, with varying types of gillnet gear. However, a small amount of shark targeted gillnet effort continues to be observed. The Southeast Gillnet Observer Program, in its continuing efforts to adapt to the fishery, currently covers all anchored (sink and stab), strike, or drift gillnet fishing regardless of target by vessels that fish from Florida to North Carolina and the Gulf of Mexico year-round.

Herein, we summarize fishing effort and catch and bycatch in these fisheries during January 2012 - December 2012, collectively referred to as '2012'.

Methods

Observer protocol

Vessels were selected on a quarterly basis (January, April, July, and September) randomly from a pool of vessels that had reported fishing with gillnet gear during the same quarter in the previous year in the NMFS Coastal Fisheries Logbook. Selection letters notifying

permit holders of required observer coverage were issued via U.S. Certified mail approximately one month prior to the upcoming selection period. Receipt of selection letters was confirmed via signature upon acceptance by the permit holder or their proxy. Once the permit holder received the selection letter, he or she was required to make contact with the observer coordinator and indicate intent to fish during the upcoming selection period. Contact was usually made by phone, and the observer coordinator gathered information concerning the vessel's name, captain, contact persons and phone numbers, communications and safety equipment available aboard the vessel, and information about the vessel's location, dates, and times of departure and return. Additional information collected included whether the vessel was active in another fishery, under repair, or no longer fishing. Upon notification of the intention to fish, the observer coordinator deployed an observer to the reported port of departure of permit holder's vessel. Because gillnet trips are generally 24 hours or less (from the time of departure from port to the time of return), the observer remained assigned to the vessel for a minimum of 3 trips.

Observations were made as the net was hauled aboard. The observer remained on the deck of the vessel in a position with an unobstructed view and recorded species and numbers of individuals caught. When species identification was questionable, the crew stopped hauling so that the observer could examine the animal(s) for positive identification. Status (alive or dead when boated) of individuals was recorded, and disposition of individuals brought onboard was recorded as kept, discarded alive, or discarded dead. Fork lengths (cm FL) were estimated for the entire catch. When time permitted after the haulback was complete, observers directly measured a random group of 10 individuals from each species for fork length (FL, measured on a straight line) in cm. Sex (sharks only) was determined when possible. Biological samples (e.g. otoliths, vertebrae, reproductive organs, stomach), when taken, were removed and placed on ice after

collection. Data and samples were submitted to the NMFS Southeast Fisheries Science Center (SEFSC), Panama City staff immediately upon completion of observed trips. The data were entered and proofed by SEFSC staff, examined by NMFS/SEFSC Sustainable Fisheries Division staff, and reviewed with observer contract staff to resolve any questions.

Results

A total of 316 sets comprising various gillnet fisheries were observed in 2012. Set locations ranged from North Carolina to the Florida Keys in the Atlantic Ocean and the Gulf of Mexico (Figures 1-4). However, location-specific reports of trips cannot be documented herein due to vessel confidentiality laws, therefore observations will be summarized by gear type. Weights for shark and teleost catch referenced herein (Tables 6 and 7) were back-calculated using estimated length (cm FL) measurements and length-weight conversions (Wigley et al. 2003; NMFS, unpublished data).

Drift gillnet fishery

A total of 2 gillnet vessels were observed making 10 drift sets on 5 trips in 2012. Vessels either targeted sharks or Spanish mackerel. In previous years, drift gillnets have been used to target large and small coastal sharks and mackerel species. Drift gillnet effort does still occur to some extent in the fishery, but has been limited by the recent changes to shark regulations. Further presentation of the data was not possible due to violation of vessel confidentiality.

Strike gillnet fishery

A total of 5 gillnet vessels were observed making 6 strike sets on 6 trips in 2012. These vessels targeted king mackerel exclusively. Vessels fished with nets ranging 91.4 – 512.1 m (300 - 1680 ft) long, net depths of 27.4 – 36.0 m (90 – 118 ft) and stretched mesh sizes 8.9 – 12.1 cm (3.5 – 4.8 in). Set duration averaged 0.05 hr (0.01 S.D.). Hauls averaged 1.66 hr (0.90 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 8.46 hr (3.69 S.D.). Sets were made in waters averaging 21.9 m (0.6 S.D.) deep. The distribution of observed strike gillnet fishing effort is illustrated in Figure 1.

Observed strike gillnet fishery catches

Catch composition by number of all king mackerel targeted sets was 99.99 % teleosts and 0.01 elasmobranchs (Table 1). Catch was almost completely composed of king mackerel, *Scomberomorus cavalla* (99.80 %). Other catch included frigate mackerel, *Auxis thaza*, (0.10 %), bonito, *Sarda sarda*, (0.10 %), little tunny, *Euthynnus alletteratus*, (0.03 %), red grouper, *Epinephelus morio*, (0.02 %), and great barracuda, *Sphyrnaena barracuda* (0.01 %). Blacktip shark, *Carcharhinus limbatus*, made up 100.00 % of the shark catch by number and weight. Catches by weight of commercially important teleosts are given in Table 7. No sharks from king mackerel targeted sets were measured directly.

Average size from strike gillnet sets

Average (S.D.) fork lengths of teleosts caught in king mackerel targeted sets ranged from 46.2 cm (3.6) for little tunny, to 91.2 cm (15.6) for king mackerel. The average (S.D.) lengths of teleosts measured in king mackerel targeted sets can be found in Table 9.

Sink gillnet fishery

A total of 62 trips totaling 300 sink net sets on 18 vessels were observed in 2012. Trips were made targeting one or more of the following: smooth dogfish, *Mustelus canis*, Spanish mackerel, *Scomberomorus maculatus*, southern kingfish, *Menticirrhus americanus*, and mixed teleosts (including Atlantic croaker *Micropogonias undulatus*, bluefish *Pomatomus saltatrix*, and mixed species). Refinement of the data by target species was possible except for mixed species targeted sets, which were excluded.

Spanish mackerel targeted sink gillnet

Thirty-four observed trips were made on 12 vessels for a total of 186 sink gillnet sets targeting Spanish mackerel. Vessels fished with nets ranging 45.8 – 731.5 m (150 - 2400 ft) long, net depths of 3.4 – 7.6 m (11.0 – 24.8 ft) and stretched mesh sizes 7.6 – 9.7 cm (3.0 – 3.8 in). Set duration averaged 0.10 hr (0.07 S.D.). Hauls averaged 0.50 hr (0.52 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 1.90 hr (1.30 S.D.). Sets were made in waters averaging 8.2 m (4.0 S.D.) deep. Observed Spanish mackerel targeted sink gillnet fishing effort is illustrated in Figure 2.

Observed Spanish mackerel targeted sink gillnet catches

Catch composition by number of all Spanish mackerel targeted sets was 94.10 % teleosts, 3.90 % elasmobranchs, 1.90 % invertebrates, and 0.10 % batoids (Table 2). By number, shark catch was made up of Atlantic sharpnose shark, *Rhizoprionodon terraenovae* (65.50 %), bonnethead shark, *Sphyrna tiburo* (25.20 %) and scalloped hammerhead shark, *Sphyrna lewini* (4.60 %). By weight the shark catch was made up of Atlantic sharpnose shark (66.10 %) followed by scalloped hammerhead shark (19.80 %) and bonnethead shark (9.40 %). Catches by

weight of sharks are given in Table 6. Spanish mackerel made up 32.80 % of the teleost catch by number, followed by Atlantic bumper, *Chloroscombrus chrysurus* (20.50 %), harvestfish, *Peprilus alepidotus* (20.20 %) and bluefish (7.50 %). Catches by weight of commercially important teleosts can be found in Table 7.

Average size from Spanish mackerel targeted sets

Average (S.D.) fork lengths of sharks caught in Spanish mackerel targeted sets ranged from 55.2 cm (20.5) for bonnethead shark, to 100.0 cm (0.0) for common thresher shark, *Alopias vulpinus*. The average (S.D.) lengths of sharks measured by target can be found in Table 8.

Average (S.D.) fork lengths of teleosts caught in Spanish mackerel targeted sets ranged from 8.3 cm (0.5) for pinfish *Lagodon rhomboides*, to 106.3 cm (6.1) for Atlantic cutlassfish, *Trichiurus lepturus*. Average (S.D.) lengths of teleosts ($n \geq 5$) measured by target can be found in Table 9.

Protected resources interactions from Spanish mackerel targeted sets

Three interactions with protected resources were documented in 186 sets observed targeting Spanish mackerel with sink gillnets in 2012. One leatherback sea turtle, *Dermochelys coriacea*, and one unidentified sea turtle were caught and released alive (0.01 % of the total catch; Table 2). One common loon, *Gavia immer*, was caught and released dead (0.00 % of the total catch; Table 2).

Smooth dogfish targeted sink gillnet

Ten observed trips were made on 3 vessels for a total of 16 sink gillnet sets targeting smooth dogfish *Mustelus canis*. Vessels fished with nets ranging 182.9 – 731.5 m (600 - 2400 ft) long, net depths of 4.2 – 6.4 m (13.8 – 21.0 ft) and stretched mesh sizes 12.7 – 14.7 cm (5.0 – 5.8

in). Set duration averaged 0.09 hr (0.03 S.D.). Hauls averaged 0.68 hr (0.48 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 8.90 hr (10.07 S.D.). Sets were made in waters averaging 19.5 m (2.7 S.D.) deep. Observed smooth dogfish targeted sink gillnet fishing effort is illustrated in Figure 3.

Observed smooth dogfish targeted sink gillnet catches

Catch composition by number of all smooth dogfish targeted sets was 87.40 % elasmobranchs and 12.60 % teleosts (Table 3). By number, shark catch was primarily smooth dogfish (87.40 %), followed by Atlantic sharpnose shark (3.90 %) and sandbar shark, *Carcharhinus plumbeus* (3.80 %). By weight the shark catch was made up mostly of smooth dogfish (74.70 %), followed by common thresher shark, (10.80 %) and sandbar shark (4.70; Table 6). Atlantic menhaden, *Brevoortia tyrannus* made up 47.60 % of the teleost catch by number, followed by shads, *Alosa* sp. (30.10 %), little tunny (4.90 %) and searobins, *Prionotus* sp. (4.90 %). Catches by weight of commercially important teleosts can be found in Table 7.

Average size from smooth dogfish targeted sets

Average (S.D.) fork lengths of sharks caught in smooth dogfish targeted sets ranged from 70.0 cm (0.0) for spinner shark, *Carcharhinus brevipinna*, to 141.8 cm (13.7) for common thresher shark. The average (S.D.) lengths of sharks measured by target can be found in Table 8. Average (S.D.) fork lengths of teleosts caught in smooth dogfish targeted sets ranged from 26.4 cm (4.0) for Atlantic menhaden, to 76.6 cm (9.8) for cobia, *Rachycentron canadum* (Table 9).

Southern kingfish targeted sink gillnet

Seven observed trips were made on 4 vessels for a total of 36 sink gillnet sets targeting southern kingfish, *Menticirrhus americanus*. Vessels fished with nets ranging 137.2 – 365.8 m

(450 - 1200 ft) long, net depths of 1.5 – 2.7 m (5.0 – 9.0 ft) and stretched mesh sizes 6.4 – 6.6 cm (2.5 – 2.6 in). Set duration averaged 0.05 hr (0.03 S.D.). Hauls averaged 0.26 hr (0.06 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 2.2 hr (1.4 S.D.). Sets were made in waters averaging 12.2 m (3.4 S.D.) deep. Observed southern kingfish targeted sink gillnet fishing effort is illustrated in Figure 4.

Observed Southern kingfish targeted sink gillnet catches

Catch composition by number of all southern kingfish targeted sets was 98.03 % teleosts and 1.80 % elasmobranchs (Table 4). By number, shark catch was made up of spiny dogfish, *Squalus acanthias* (92.70 %) and sandbar shark (7.30 %). Shark catch composition by weight was similar, made up entirely of spiny dogfish (88.60 %) and sandbar shark (11.4 %; Table 6). Southern kingfish made up 43.70 % of the teleost catch by number, followed by Atlantic butterfish, *Peprilus triacanthus* (37.30 %), Atlantic menhaden (11.90 %) and Atlantic croaker (3.20 %). Catches by weight of commercially important teleosts can be found in Table 7.

Average size from southern kingfish targeted sets

Average (S.D.) fork lengths of teleosts caught in southern kingfish targeted sets ranged from 15.5 cm (2.3) for Atlantic butterfish, to 36.0 cm (5.7) for shads (Table 9). No sharks from southern kingfish targeted sink sets were measured directly.

Mixed teleost targeted sink gillnet

Eleven observed trips were made on 4 vessels for a total of 41 sink gillnet sets. Vessels fished with nets ranging 91.4 – 274.3 m (300 - 900 ft) long, net depths of 2.1 – 3.4 m (6.8 – 11.3 ft) and stretched mesh sizes 7.6 – 9.9 cm (3.0 – 3.9 in). Set duration averaged 0.05 hr (0.01 S.D.). Hauls averaged 0.60 hr (0.60 S.D.). The entire fishing process (time net was first set until

time haul back was completed) averaged 2.50 hr (1.60 S.D.). Sets were made in waters averaging 19.4 m (7.9 S.D.) deep. Observed mixed teleost targeted sink gillnet effort could not be illustrated due to vessel confidentiality.

Observed mixed teleost targeted sink gillnet catches

Catch composition by number of all mixed teleost targeted sets was 99.70 % teleosts, 0.30 % elasmobranchs, 0.02 % invertebrates, and 0.01 % batoids (Table 5). By number, shark catch was Atlantic sharpnose shark (30.90 %), smooth dogfish (29.10 %) and bonnethead shark (18.20 %). By weight the shark catch was Atlantic sharpnose shark (29.90 %), bonnethead shark (20.00 %), and smooth dogfish (19.70 %; Table 6). Atlantic croaker made up 97.00 % of the teleost catch by number, followed by Atlantic butterfish (1.03 %), Atlantic menhaden (0.80 %), and bluefish (0.30 %). Catches by weight of commercially important teleosts can be found in Table 7.

Average size from mixed teleosts targeted sets

Average (S.D.) fork lengths of sharks caught in mixed teleosts targeted sets ranged from 54.0 cm (9.9) for sandbar shark, to 79.9 cm (5.8) for smooth dogfish. The average (S.D.) lengths of sharks measured by target can be found in Table 8. Average (S.D.) fork lengths of teleosts caught in mixed teleosts targeted sets ranged from 12.8 cm (2.3) for Atlantic butterfish, to 66.0 cm (0.0) for little tunny (Table 9).

Discussion

The trend of declining effort in the LCS targeted gillnet fishery continued to be observed in 2012. Strike gillnet gear was observed exclusively in teleost (king mackerel) targeted sets. The presence of a small amount of drift gillnet effort observed in 2012 relative to zero observed drift

effort in 2011 is explained by random inclusion in the 2012 vessel selections of some of the small proportion of the fleet that still utilizes this gear. Sink gillnet fishers continued to target those shark species with less restrictive landing limitations (smooth and spiny dogfish); however, the majority of observed sink gillnet effort targeted teleost species. Incidental take of protected species remained a relatively rare occurrence. The SGOP continues to monitor catch and bycatch as the southeast US gillnet fishery continues to adapt to changing regulations.

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References

- Carlson, J.K. and D.M. Bethea. 2007. Catch and bycatch in the shark gillnet fishery: 2005-2006. NOAA Technical Memorandum NMFS-SEFSC-552, 26 p.
- National Marine Fisheries Service (NMFS). 2007. Amendment 2 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan. NOAA/NMFS, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD. 726 p.
- National Marine Fisheries Service (NMFS). 2010. Amendment 3 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan. NOAA/NMFS, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD. 632 p.
- Passerotti, M.S., J.K. Carlson, S.J.B. Gulak. 2011. Catch and Bycatch in U.S. Southeast Gillnet Fisheries, 2010. NOAA Technical Memorandum NMFS-SEFSC-612. 19 p.
- Wigley, S.E., McBride, H.M., and N.J. McHugh. 2003. Length-Weight Relationships for 74 Fish Species Collected during NEFSC Research Vessel Bottom Trawl Surveys, 1992-99. NOAA Technical Memorandum NMFS-NE-171, 36 p.

Figure 1. Distribution of observed strike gillnet sets targeting king mackerel, *Scomberomorus cavalla*, 2012 (n=6 sets).

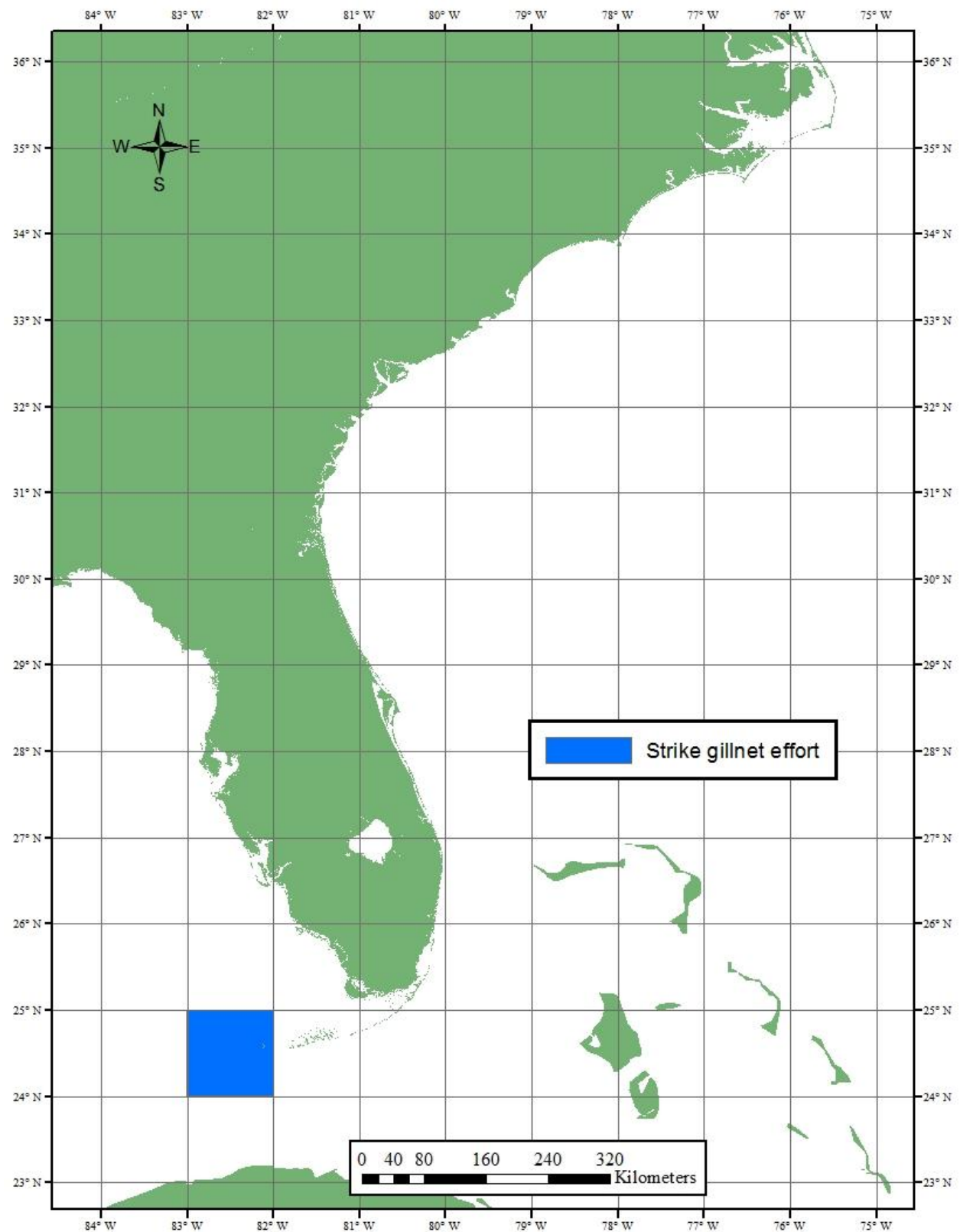


Figure 2. Distribution of observed sink gillnet sets targeting Spanish mackerel, *Scomberomorus maculatus*, 2012 (n=186 sets).

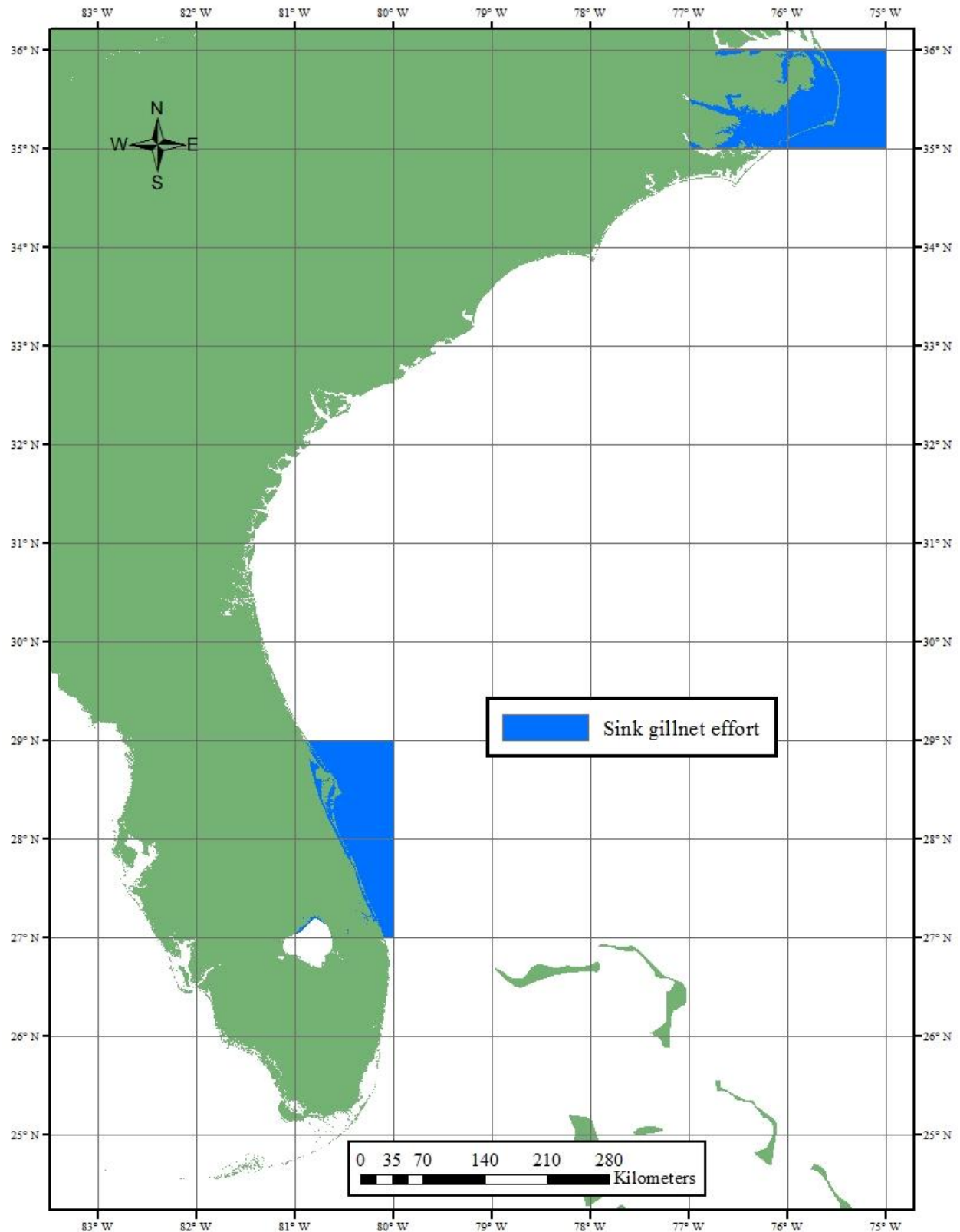


Figure 3. Distribution of observed sink gillnet sets targeting smooth dogfish, *Mustelus canis*, 2012 (n=16 sets).

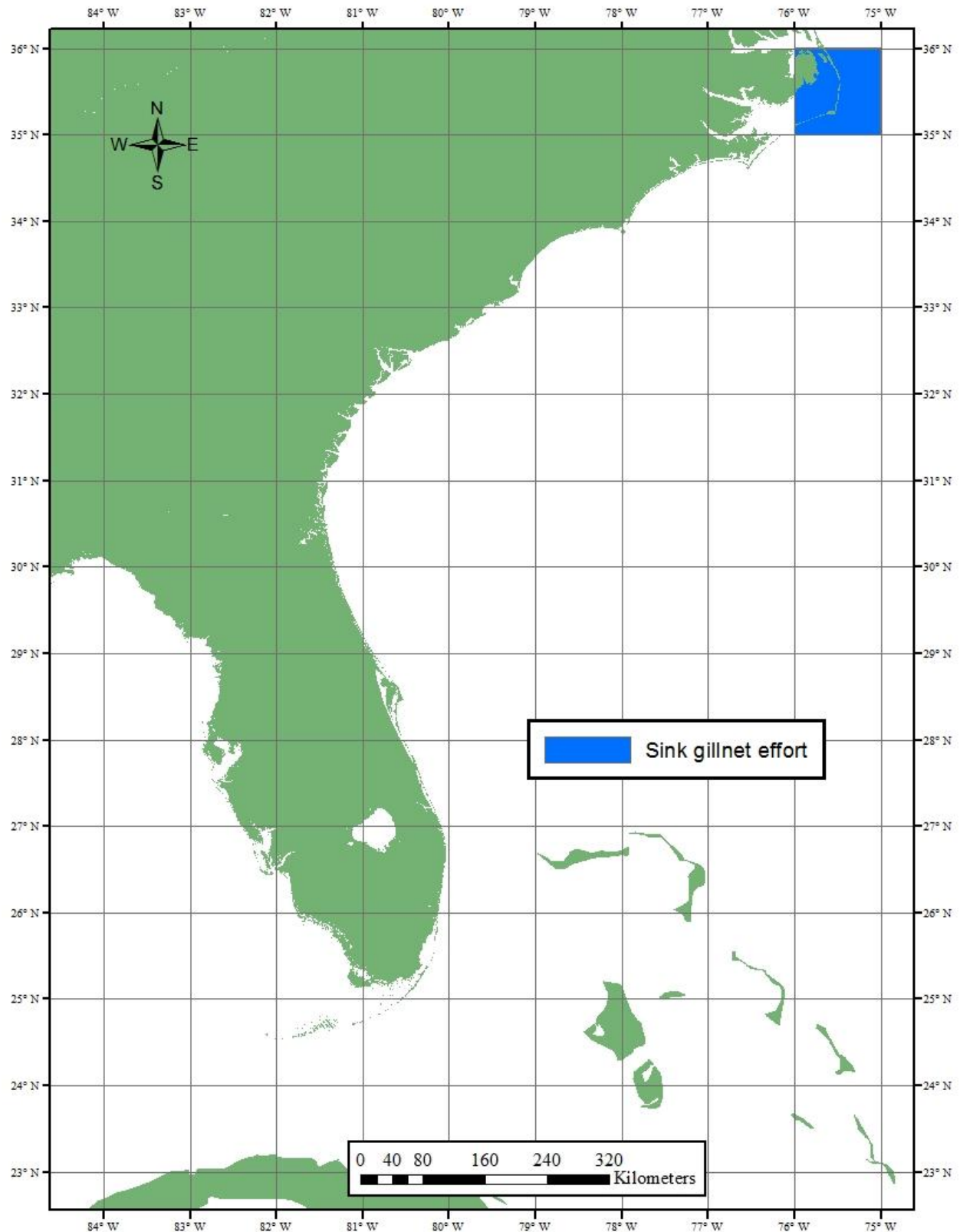


Figure 4. Distribution of observed sink gillnet sets targeting southern kingfish, *Menticirrhus americanus*, 2012 (n=36 sets).

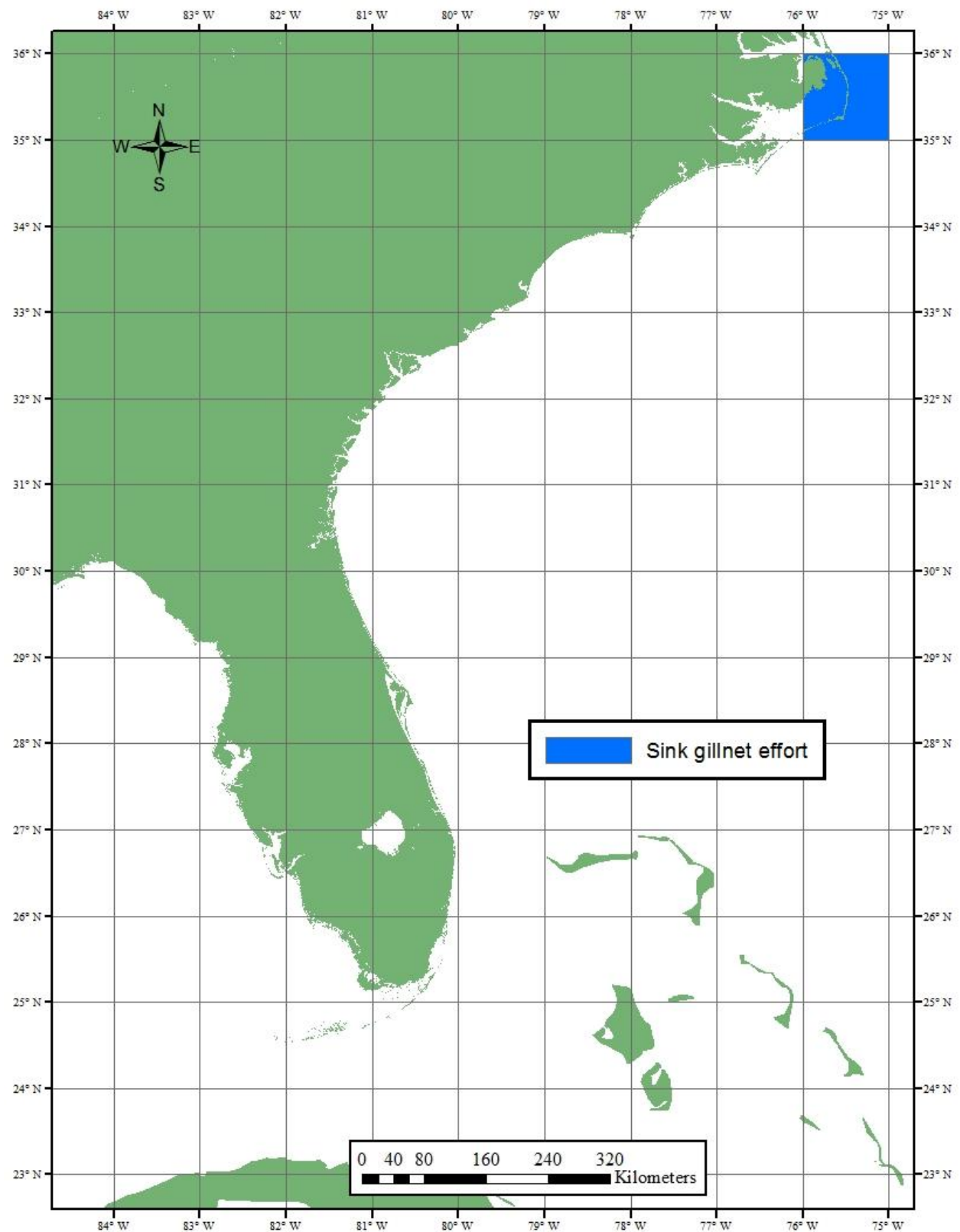


Table 1. Total strike gillnet catch from king mackerel targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2012. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Scomberomorus cavalla</i>	King mackerel	16966	98.7	0	1.3
<i>Auxis thaza</i>	Frigate mackerel	13	0	0	100
<i>Sarda sarda</i>	Bonito	11	36.4	0	63.6
<i>Euthynnus alletteratus</i>	Little tunny	5	100	0	0
<i>Epinephelus morio</i>	Red grouper	4	0	50	50
<i>Carcharhinus limbatus</i>	Blacktip shark	2	0	50	50
<i>Sphyraena barracuda</i>	Great barracuda	1	0	0	100

Table 2. Total sink gillnet catch from Spanish mackerel targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2012. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Scomberomorus maculatus</i>	Spanish mackerel	6878	97.5	0.0	2.5
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	4290	83.8	7.3	8.9
<i>Peprilus alepidotus</i>	Harvestfish	4238	99.2	0.4	0.3
<i>Pomatomus saltatrix</i>	Bluefish	1564	85.1	4.0	10.9
<i>Micropogonias undulatus</i>	Atlantic croaker	1401	90.3	4.1	5.6
<i>Caranx crysos</i>	Blue runner	727	14.9	17.5	67.7
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	537	42.6	47.1	10.2
<i>Majidae</i>	Spider crabs	437	0.0	48.5	51.5
<i>Trichiurus lepturus</i>	Atlantic cutlassfish	393	98.7	0.0	1.3
<i>Sphyrna tiburo</i>	Bonnethead shark	207	20.3	20.8	58.9
<i>Peprilus triacanthus</i>	Atlantic butterfish	184	98.9	0.5	0.5
<i>Leiostomus xanthurus</i>	Spot	181	98.9	0.0	1.1
<i>Trachinotus carolinus</i>	Florida pompano	158	96.2	3.2	0.6
<i>Menticirrhus americanus</i>	Southern kingfish	157	98.1	0.0	1.9
<i>Caranx hippos</i>	Creville jack	136	100.0	0.0	0.0
<i>Selene setapinnis</i>	Moonfish	106	34.0	19.8	46.2
<i>Larimus fasciatus</i>	Banded drum	93	0.0	8.6	91.4
<i>Brevoortia tyrannus</i>	Atlantic menhaden	63	4.8	73.0	22.2
<i>Rachycentron canadum</i>	Cobia	62	1.6	80.7	17.7
<i>Auxis thaza</i>	Frigate mackerel	58	93.1	0.0	6.9
<i>Lagodon rhomboides</i>	Pinfish	57	0.0	56.1	43.9
<i>Cynoscion regalis</i>	Weakfish	57	56.1	0.0	43.9
<i>Carcharhinus brevipinna</i>	Spinner shark	50	44.0	56.0	0.0
<i>Sphyrna lewini</i>	Scalloped hammerhead shark	38	5.3	21.1	73.7
<i>Chaetodipterus faber</i>	Spadefish	32	0.0	75.0	25.0
<i>Arius felis</i>	Hardhead catfish	31	12.9	64.5	22.6
<i>Mustelus canis</i>	Smooth dogfish	29	69.0	31.0	0.0
<i>Synodus foetens</i>	Inshore lizardfish	19	0.0	42.1	57.9
<i>Echeneis naucrates</i>	Sharksucker	12	0.0	100.0	0.0
<i>Scomberomorus cavalla</i>	King mackerel	11	36.4	0.0	63.6
<i>Elops saurus</i>	Ladyfish	10	100.0	0.0	0.0
<i>Tylosurus crocodilus</i>	Houndfish	7	100.0	0.0	0.0
<i>Carcharhinus acronotus</i>	Blacknose shark	6	50.0	0.0	50.0
<i>Raja eglanteria</i>	Clearnose skate	6	0.0	100.0	0.0
<i>Caranx sp.</i>	Jacks	6	100.0	0.0	0.0

continued

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Euthynnus alletteratus</i>	Little tunny	6	100.0	0.0	0.0
<i>Dasyatis americana</i>	Southern stingray	6	0.0	100.0	0.0
<i>Centropristis striata</i>	Black seabass	4	0.0	100.0	0.0
<i>Archosargus probatocephalus</i>	Sheepshead	4	100.0	0.0	0.0
Undefined	Undefined	4	0.0	100.0	0.0
<i>Hippocampus erectus</i>	Lined seahorse	3	0.0	100.0	0.0
<i>Synodus intermedius</i>	Sanddiver lizardfish	3	0.0	0.0	100.0
<i>Paralichthys lethostigma</i>	Southern flounder	3	0.0	100.0	0.0
<i>Carcharhinus limbatus</i>	Blacktip shark	2	0.0	50.0	50.0
<i>Callinectes sapidus</i>	Blue crab	2	0.0	100.0	0.0
<i>Prionotus scitulus</i>	Leopard searobin	2	0.0	100.0	0.0
<i>Ogcocephalidae</i>	Batfish family	1	0.0	100.0	0.0
<i>Gavia immer</i>	Common loon	1	0.0	0.0	100.0
<i>Alopias vulpinus</i>	Common thresher shark	1	100.0	0.0	0.0
<i>Paralichthys</i> sp.	Flounders	1	0.0	100.0	0.0
<i>Bagre marinus</i>	Gafftopsail catfish	1	0.0	100.0	0.0
<i>Limulus polyphemus</i>	Horseshoe crab	1	0.0	100.0	0.0
<i>Dermochelys coriacea</i>	Leatherback sea turtle	1	0.0	100.0	0.0
<i>Manta birostris</i>	Manta ray	1	0.0	100.0	0.0
<i>Tetraodontidae</i>	Puffer family	1	0.0	100.0	0.0
<i>Scianops ocellatus</i>	Red drum	1	0.0	100.0	0.0
<i>Sea Turtle</i>	Sea turtles	1	0.0	100.0	0.0
<i>Prionotus</i> sp.	Searobins	1	0.0	0.0	100.0
<i>Alosa</i> sp.	Shads	1	0.0	0.0	100.0
<i>Dasyatis</i> sp.	Stingrays	1	0.0	100.0	0.0

Table 3. Total sink gillnet catch from smooth dogfish targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2012. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species Caught	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Mustelus canis</i>	Smooth dogfish	623	99.8	0.0	0.2
<i>Brevoortia tyrannus</i>	Atlantic menhaden	49	4.1	0.0	95.9
<i>Alosa sp.</i>	Shads	31	35.5	0.0	64.5
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	28	100.0	0.0	0.0
<i>Carcharhinus plumbeus</i>	Sandbar shark	27	3.7	96.3	0.0
<i>Sphyrna lewini</i>	Scalloped hammerhead shark	11	0.0	0.0	100.0
<i>Squatina dumeril</i>	Atlantic angel shark	11	0.0	100.0	0.0
<i>Alopias vulpinus</i>	Common thresher shark	6	100.0	0.0	0.0
<i>Euthynnus alletteratus</i>	Little tunny	5	100.0	0.0	0.0
<i>Prionotus sp.</i>	Searobins	5	100.0	0.0	0.0
<i>Rachycentron canadum</i>	Cobia	5	100.0	0.0	0.0
<i>Carcharias taurus</i>	Sand tiger shark	3	0.0	33.3	66.7
<i>Galeocerdo cuvier</i>	Tiger shark	2	0.0	100.0	0.0
<i>Paralichthys sp.</i>	Flounders	2	50.0	50.0	0.0
<i>Scomberomorus cavalla</i>	King mackerel	2	100.0	0.0	0.0
<i>Archosargus probatocephalus</i>	Sheepshead	1	100.0	0.0	0.0
<i>Carcharhinus brevipinna</i>	Spinner shark	1	0.0	0.0	100.0
<i>Carcharhinus obscurus</i>	Dusky shark	1	0.0	100.0	0.0
<i>Lophius sp.</i>	Monkfish anglerfish	1	100.0	0.0	0.0
<i>Micropogonias undulatus</i>	Atlantic croaker	1	0.0	0.0	100.0
<i>Pomatomus saltatrix</i>	Bluefish	1	100.0	0.0	0.0

Table 4. Total sink gillnet catch from southern kingfish targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2012. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species Caught	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Menticirrhus americanus</i>	Southern kingfish	957	99.2	0.0	0.8
<i>Peprilus triacanthus</i>	Atlantic butterfish	818	98.5	1.1	0.4
<i>Brevoortia tyrannus</i>	Atlantic menhaden	261	74.0	17.6	8.4
<i>Micropogonias undulatus</i>	Atlantic croaker	71	100.0	0.0	0.0
<i>Pomatomus saltatrix</i>	Bluefish	58	98.3	1.7	0.0
<i>Squalus acanthias</i>	Spiny dogfish	38	0.0	76.3	23.7
<i>Cynoscion regalis</i>	Weakfish seatrout	22	54.6	0.0	45.5
<i>Carcharhinus plumbeus</i>	Sandbar shark	3	0.0	100.0	0.0
<i>Alosa sp.</i>	Shads	2	100.0	0.0	0.0
<i>Leiostomus xanthurus</i>	Spot	2	0.0	0.0	100.0
<i>Raja eglanteria</i>	Clearnose skate	2	0.0	100.0	0.0
<i>Bairdiella chrysoura</i>	Silver perch	1	0.0	100.0	0.0
<i>Cancer borealis</i>	Jonah crab	1	0.0	100.0	0.0

Table 5. Total sink gillnet catch from mixed teleost targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2012. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species Caught	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Micropogonias undulatus</i>	Atlantic croaker	18692	99.5	0.2	0.4
<i>Peprilus triacanthus</i>	Atlantic butterfish	199	97.5	1.5	1.0
<i>Brevoortia tyrannus</i>	Atlantic menhaden	158	74.7	7.6	17.7
<i>Pomatomus saltatrix</i>	Bluefish	64	98.4	0.0	1.6
<i>Larimus fasciatus</i>	Banded drum	59	0.0	42.4	57.6
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	53	90.6	9.4	0.0
<i>Leiostomus xanthurus</i>	Spot	21	85.7	0.0	14.3
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	17	0.0	100.0	0.0
<i>Mustelus canis</i>	Smooth dogfish	16	43.8	50.0	6.3
<i>Menticirrhus americanus</i>	Southern kingfish	10	100.0	0.0	0.0
<i>Sphyrna tiburo</i>	Bonnethead shark	10	0.0	100.0	0.0
<i>Centropristis striata</i>	Black seabass	7	57.1	42.9	0.0
<i>Squalus acanthias</i>	Spiny dogfish	6	0.0	83.3	16.7
<i>Cynoscion regalis</i>	Weakfish seatrout	5	0.4	0.0	0.6
<i>Opisthonema oglinum</i>	Atlantic thread herring	4	0.0	100.0	0.0
<i>Sphyrna lewini</i>	Scalloped hammerhead shark	4	0.0	100.0	0.0
<i>Selene setapinnis</i>	Moonfish	3	0.0	100.0	0.0
<i>Euthynnus alletteratus</i>	Little tunny	3	100.0	0.0	0.0
<i>Callinectes sapidus</i>	Blue crab	2	0.0	100.0	0.0
<i>Carcharhinus plumbeus</i>	Sandbar shark	2	0.0	100.0	0.0
<i>Aetobatis narinari</i>	Spotted eagle ray	2	0.0	100.0	0.0
<i>Rachycentron canadum</i>	Cobia	2	0.0	100.0	0.0
<i>Limulus polyphemus</i>	Horseshoe crab	1	100.0	0.0	0.0
<i>Menticirrhus americanus</i>	Southern kingfish	1	100.0	0.0	0.0
<i>Archosargus probatocephalus</i>	Sheepshead	1	100.0	0.0	0.0
<i>Caranx hippos</i>	Crevalle jack	1	100.0	0.0	0.0

Table 6. Estimated shark catch by weight (kg), back-calculated from estimated lengths of all sharks observed caught in sink and strike (king mackerel) gillnet gear by target, 2012.

Target	Species	Common Name	Catch (kg)	% Total Sharks
King mackerel	<i>Carcharhinus limbatus</i>	Blacktip shark	26.30	100.0
	Total-King mackerel		26.30	-
Spanish mackerel	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	1280.78	66.1
	<i>Sphyrna lewini</i>	Scalloped hammerhead shark	384.73	19.8
	<i>Sphyrna tiburo</i>	Bonnethead shark	181.91	9.4
	<i>Mustelus canis</i>	Smooth dogfish	43.42	2.2
	<i>Alopias vulpinus</i>	Common thresher shark	23.21	1.2
	<i>Carcharhinus acronotus</i>	Blacknose shark	20.95	1.1
	<i>Carcharhinus limbatus</i>	Blacktip shark	3.60	0.2
	Total-Spanish mackerel		1938.61	-
Smooth Dogfish	<i>Mustelus canis</i>	Smooth dogfish	2200.47	74.7
	<i>Alopias vulpinus</i>	Common thresher shark	319.72	10.8
	<i>Carcharhinus plumbeus</i>	Sandbar shark	139.31	4.7
	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	82.14	2.8
	<i>Sphyrna lewini</i>	Scalloped hammerhead shark	80.21	2.7
	<i>Squatina dumeril</i>	Atlantic angel shark	78.65	2.7
	<i>Galeocerdo cuvier</i>	Tiger shark	32.13	1.1
	<i>Carcharias taurus</i>	Sand tiger shark	6.38	0.2
	<i>Carcharhinus obscurus</i>	Dusky shark	5.43	0.2
	<i>Carcharhinus brevipinna</i>	Spinner shark	2.78	0.1
	Total-Smooth Dogfish		2947.23	-
Southern kingfish	<i>Squalus acanthias</i>	Spiny dogfish	112.65	88.6
	<i>Carcharhinus plumbeus</i>	Sandbar shark	14.53	11.4
	Total-Southern kingfish		127.18	-
Mixed Teleosts	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	34.16	29.9
	<i>Sphyrna tiburo</i>	Bonnethead shark	22.80	20.0
	<i>Mustelus canis</i>	Smooth dogfish	22.57	19.7
	<i>Sphyrna lewini</i>	Scalloped hammerhead shark	15.03	13.2
	<i>Squalus acanthias</i>	Spiny dogfish	13.83	12.1
	<i>Carcharhinus plumbeus</i>	Sandbar shark	5.88	5.1
	Total-Mixed teleosts		114.26	-

Table 7. Estimated catch by weight (kg) of commercially important teleosts, back-calculated from estimated lengths of all individuals observed caught in sink and strike (king mackerel) gillnet gear by target, 2012.

Target	Species	Common name	Catch (kg)
King mackerel	<i>Scomberomorus cavalla</i>	King mackerel	112534.54
	<i>Euthynnus alletteratus</i>	Little tunny	7.18
Spanish mackerel	<i>Scomberomorus maculatus</i>	Spanish mackerel	6343.62
	<i>Pomatomus saltatrix</i>	Bluefish	1818.66
	<i>Chloroscombrus chrysurus</i>	Atlantic bumper	257.28
	<i>Menticirrhus americanus</i>	Southern kingfish	123.67
	<i>Rachycentron canadum</i>	Cobia	91.41
	<i>Micropogonias undulatus</i>	Atlantic croaker	84.50
	<i>Cynoscion regalis</i>	Weakfish seatrout	30.63
	<i>Euthynnus alletteratus</i>	Little tunny	29.96
	<i>Brevoortia tyranus</i>	Atlantic menhaden	15.74
	<i>Peprilus triacanthus</i>	Atlantic butterfish	12.15
	<i>Scomberomorus cavalla</i>	King mackerel	10.35
	<i>Leiostomus xanthurus</i>	Spot	10.28
	<i>Larimus fasciatus</i>	Banded drum	4.48
	<i>Chaetodipterus faber</i>	Spadefish	3.58
	<i>Alosa</i> sp.	Shads	1.13
	<i>Centropristis striata</i>	Black seabass	0.19
	<i>Prionotus</i> sp.	Searobins	0.03
Smooth dogfish	<i>Brevoortia tyranus</i>	Atlantic menhaden	36.82
	<i>Alosa</i> sp.	Shads	35.04
	<i>Rachycentron canadum</i>	Cobia	23.48
	<i>Euthynnus alletteratus</i>	Little tunny	7.18
	<i>Scomberomorus cavalla</i>	King mackerel	6.46
	<i>Prionotus</i> sp.	Searobins	6.20
	<i>Lophius</i> sp.	Monkfish anglerfish	1.51
	<i>Pomatomus saltatrix</i>	Bluefish	1.22
	<i>Micropogonias undulatus</i>	Atlantic croaker	0.04
Southern kingfish	<i>Menticirrhus americanus</i>	Southern kingfish	795.98
	<i>Peprilus triacanthus</i>	Atlantic butterfish	54.04
	<i>Brevoortia tyranus</i>	Atlantic menhaden	23.62
	<i>Pomatomus saltatrix</i>	Bluefish	15.42
	<i>Cynoscion regalis</i>	Weakfish seatrout	9.76
	<i>Micropogonias undulatus</i>	Atlantic croaker	2.83
	<i>Alosa</i> sp.	Shads	2.26
	<i>Leiostomus xanthurus</i>	Spot	0.11
Mixed teleosts	<i>Micropogonias undulatus</i>	Atlantic croaker	14575.55
	<i>Brevoortia tyranus</i>	Atlantic menhaden	180.87
	<i>Pomatomus saltatrix</i>	Bluefish	75.74
	<i>Euthynnus alletteratus</i>	Little tunny	14.98

Target	Species	Common name	Catch (kg)
	<i>Menticirrhus americanus</i>	Southern kingfish	13.69
	<i>Peprilus triacanthus</i>	Atlantic butterfish	13.15
	<i>Rachycentron canadum</i>	Cobia	5.69
	<i>Chloroscombrus chrysurus</i>	Atlantic bumper	3.18
	<i>Centropristis striata</i>	Black seabass	2.90
	<i>Larimus fasciatus</i>	Banded drum	2.84
	<i>Cynoscion regalis</i>	Weakfish seatrout	1.81
	<i>Leiostomus xanthurus</i>	Spot	1.19

Table 8. Average size (fork length, FL) and standard deviation (S.D.) of sharks measured for all observed sink gillnet trips by target, 2012.

Target	Species Caught	Common Name	n	Avg FL (cm)	S.D.
Spanish mackerel	<i>Sphyrna tiburo</i>	Bonnethead shark	63	55.2	20.5
	<i>Carcharhinus brevipinna</i>	Spinner shark	31	64.6	3.1
	<i>Mustelus canis</i>	Smooth dogfish	20	76.0	7.9
	<i>Sphyrna lewini</i>	Scalloped hammerhead shark	14	92.9	8.2
	<i>Carcharhinus acronotus</i>	Blacknose shark	5	87.2	5.7
	<i>Carcharhinus limbatus</i>	Blacktip shark	2	68.5	6.4
	<i>Alopias vulpinus</i>	Common thresher shark	1	100.0	0.0
Smooth dogfish	<i>Mustelus canis</i>	Smooth dogfish	129	85.6	13.7
	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	25	70.6	7.3
	<i>Alopias vulpinus</i>	Common thresher shark	4	141.8	13.7
	<i>Carcharhinus brevipinna</i>	Spinner shark	1	70.0	0.0
Mixed teleosts	<i>Mustelus canis</i>	Smooth dogfish	7	79.9	5.8
	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	6	56.5	7.9
	<i>Carcharhinus plumbeus</i>	Sandbar shark	2	54.0	9.9

Table 9. Average size (fork length, FL) and standard deviation (S.D.) of non-sharks measured for all observed sink and strike (king mackerel) gillnet trips by target, 2012, where sample size ≥ 5 .

Target	Species Caught	Common Name	n	Average FL (cm)	S.D.
King mackerel	<i>Scomberomorus cavalla</i>	King mackerel	103	91.2	15.6
	<i>Euthynnus alletteratus</i>	Little tunny	5	46.2	3.6
	<i>Auxis thaza</i>	Frigate mackerel	5	43.4	2.9
Spanish mackerel	<i>Scomberomorus maculatus</i>	Spanish mackerel	1370	42.0	7.1
	<i>Pomatomus saltatrix</i>	Bluefish	630	35.4	4.8
	<i>Peprilus alepidotus</i>	Harvestfish	395	13.9	2.8
	<i>Trichiurus lepturus</i>	Atlantic cutlassfish	218	106.3	6.1
	<i>Chloroscombrus chrysurus</i>	Atlantic bumper	190	19.0	1.3
	<i>Caranx crysos</i>	Bluerunner jack	188	26.3	1.2
	<i>Peprilus triacanthus</i>	Atlantic butterflyfish	121	14.8	3.2
	<i>Menticirrhus americanus</i>	Southern kingfish	116	32.7	4.9
	<i>Micropogonias undulatus</i>	Atlantic croaker	92	25.5	3.0
	<i>Trachinotus carolinus</i>	Florida pompano	73	23.3	2.8
	<i>Caranx hippos</i>	Crevalle jack	67	24.8	2.9
	<i>Auxis thaza</i>	Frigate mackerel	53	31.8	1.5
	<i>Leiostomus xanthurus</i>	Spot	52	24.2	1.3
	<i>Selene setapinnis</i>	Moonfish	35	16.3	3.2
	<i>Cynoscion regalis</i>	Weakfish seatrout	33	39.4	6.5
	<i>Scomberomorus cavalla</i>	King mackerel	11	43.4	11.3
	<i>Elops saurus</i>	Ladyfish	10	44.1	6.3
	<i>Arius felis</i>	Hardhead catfish	8	30.8	2.4
	<i>Rachycentron canadum</i>	Cobia	8	63.0	13.4
	<i>Tylosurus crocodilus</i>	Houndfish	7	67.6	7.0
	<i>Euthynnus alletteratus</i>	Little tunny	6	60.7	9.0
Smooth dogfish	<i>Alosa</i> sp.	Shads	19	51.8	3.4
	<i>Brevoortia tyranus</i>	Atlantic menhaden	14	26.4	4.0
	<i>Euthynnus alletteratus</i>	Little tunny	5	56.6	2.8
	<i>Prionotus</i> sp.	Searobins	5	30.8	0.8
	<i>Rachycentron canadum</i>	Cobia	5	76.6	9.8
Southern kingfish	<i>Menticirrhus americanus</i>	Southern kingfish	276	30.3	2.0
	<i>Peprilus triacanthus</i>	Atlantic butterflyfish	135	15.5	2.3
	<i>Brevoortia tyranus</i>	Atlantic menhaden	88	23.4	2.6
	<i>Pomatomus saltatrix</i>	Bluefish	30	28.6	2.5
	<i>Micropogonias undulatus</i>	Atlantic croaker	27	23.9	2.5
	<i>Cynoscion regalis</i>	Weakfish seatrout	14	28.6	6.7
Mixed teleost	<i>Micropogonias undulatus</i>	Atlantic croaker	291	28.07	4.23
	<i>Brevoortia tyranus</i>	Atlantic menhaden	63	31.2	3.8
	<i>Peprilus triacanthus</i>	Atlantic butterflyfish	56	12.8	2.3
continued					

Target	Species Caught	Common Name	n	Average FL (cm)	S.D.
	<i>Pomatomus saltatrix</i>	Bluefish	48	32.9	2.6
	<i>Leiostomus xanthurus</i>	Spot	16	27.3	2.1
	<i>Chloroscombrus chrysurus</i>	Atlantic bumper	13	22.8	2.6
	<i>Menticirrhus americanus</i>	Southern kingfish	10	38.3	3.3